REMARKS

Applicants amend several claims presently pending in the application as noted above, and add new claims 47-50. Support for the amendments and the new claims can be found, e.g., in the original claims, on pages 9-11, 22-26, and throughout the remainder of the specification. Thus, no new matter is added. Application is believed in condition for allowance. Accordingly, reconsideration and allowance are respectfully requested.

The Invention

The invention is directed generally to methods for skin treatment, and apparatus for implementing the methods, that call for irradiating a plurality of *spatially separated* tissue treatment portions, which are dispersed within *untreated* tissue of a selected volume, by treatment radiation. Applicants explain that one advantage to spatially separated treatment portions is that they will typically heal more rapidly, thus enhancing both patient comfort and the ability to perform follow-up treatments more quickly. *See*, e.g., specification, page 2.

More specifically, claim 1, as amended, recites a method for performing a treatment on a volume located at area and depth coordinates of a patient's skin that includes providing a radiation source, and applying radiation from the source to an optical system that provides *multiple foci* for concentrating the radiation to at least one depth within the depth coordinate and to selected areas within the area coordinates of the volume. The depth and the selected areas at which the radiation is concentrated define three dimensional treatment portions that are *separated from one another by* untreated portions of the volume.

Rejections Under 35 U.S.C. 102(b)

The Office Action rejects claims 1, 5-8, 14-16, 20, 22, 23, 25, 27-33, 35-37, 40, 41, 45 and 46 as being anticipated by U.S. Patent No. 5,968,033 of Fuller.

Fuller describes an apparatus for optically treating tissue that includes a holder at a distal end of which a tissue contact member, e.g., a spherical lens, is mounted. An optic fiber extending through the holder, or a source disposed in the holder, delivers optical energy to the contact member. In operation, the contact member, which is placed in contact with a surface

of patient's skin, converges the delivered radiation onto a portion of tissue to be treated, for example, a portion at a depth below the skin surface. The apparatus can further include channels formed in the holder for delivering a coolant to the patient's skin.

Unlike the claimed method, the contact member of Fuller does not converge the radiation to a *plurality* of regions within a selected volume that are *separated* from one another by *untreated portions* of that volume. Rather, the contact member directs the delivered radiation to a single region. Even if the contact member is scanned over the skin, the portions to which the radiation is directed form a contiguous line, and not a plurality of regions separated by untreated portions.

Thus, Fuller fails to teach at least one material feature of claim 1 (multiple foci) and its concomitant advantages. Accordingly, claim 1 distinguishes patentably over teachings of Fuller. Similarly, claims 5-8, 14-16, 20, 22, 23, and 25 that depend either directly or indirectly on claim 1 are patentable over Fuller.

Independent claim 27 recites an apparatus for performing a treatment on a volume located at area and depth coordinates of a patient's skin that includes a radiation source and an optical system to which radiation from the source can be applied. The optical system provides *a plurality of foci* for concentrating the radiation to three dimensional treatment portions in the volume within untreated portions of the volume.

Fuller's device does not include a multi-focal optical system for directing radiation to a plurality of treatment portions in a selected volume that are located within untreated portions of that volume. Rather, Fuller utilizes a contact member, e.g., a spherical lens, having a *single* focus for directing radiation to a *single* treatment region, and not a plurality of treatment regions.

Hence, similar to claim 1, claim 27, and claims 28-33; 35-37; 40 and 41 that depend directly or indirectly on claim 27, are also patentable over Fuller.

Amended Independent claim 45 recites a method for performing a therapeutic treatment on a patient's skin by utilizing a *multi-focal optical system* to concentrate applied radiation of a selected wavelength onto a plurality of three-dimensional treatment portions located within non-treatment portions.

As discussed above, Fuller does not teach a multi-focal optical system for concentrating treatment radiation at a plurality of treatment portions dispersed within untreated portions. Rather, Fuller describes utilizing a single-focus lens to direct radiation to a *single* region. Thus, claim 45 is patentable over Fuller.

Independent claim 46, as amended, recites an apparatus for performing a therapeutic treatment on a patient's skin having a multi-focal optical system for concentrating applied radiation at a plurality of selected three-dimensional portions disposed within non-treatment portions. The arguments presented above in connection with claim 45 apply with equal force to establish that claim 46 is patentable, as well.

Rejections Under 35 U.S.C. 103(a)

The Office Action rejects claims 1-12, 14-20, 22, 23, 25, 45 and 46 as being obvious in view of the combined teachings of Fuller and U.S. Patent No. 6,059,820 of Baronov.

Baronov describes a laser treatment device that includes a heat conducting rod, transparent to laser radiation, that can be held at one surface thereof in contact with tissue being treated for cooling of the tissue. The device further includes a cryogenic chamber having a valve through which a cryogenic fluid can be sprayed onto the rod to cause its cooling. A fiber optic cable transmits laser radiation to a lens that focuses the received radiation onto the rod for delivery of the radiation to the tissue under treatment via the rod's surface that is contact with the tissue. In one embodiment depicted in FIGURE 3A of Baronov, the rod includes grooves, in proximity of its surface contacting a patient's skin, that are filled with copper stripes to prevent the laser radiation from reaching certain portions of the skin.

In main embodiments of Baronov, the lens is employed to focus radiation, through the cooling rod, onto a single treatment portion rather than a plurality of treatment portions separated from one another by untreated portions, as recited in claim 1. Moreover, in the embodiment of FIGURE 3A of Baronov, a mask, which is formed by grooves filled with copper stripes, is employed to generate a patterned radiation within a *single* radiation focus provided by the lens. That is, Baronov does not utilize a multi-focal optical system to focus radiation onto a plurality of spatially separated foci to generate a pattern of treated and untreated portions, but rather generates irradiated and unirradiated portions within a single focus. In contrast, claim 1 recites employing an optical system *exhibiting multiple foci* for concentrating radiation to three dimensional treatment portions separated from one another by untreated portions.

Hence, Baronov does not teach or suggest material features of claim 1, and their concomitant advantages. For example, generating a pattern radiation within a single focus does not provide the flexibility to generate a multiplicity of treated portions, separated from one another by untreated portions, over an extended region while efficiently irradiating each treated portion with a sufficient radiation flux to cause a desired therapeutic effect. In fact, in the embodiment of FIGURE 3A of Baronov, a portion of the treatment beam is absorbed by the copper stripes, thereby resulting in not only inefficient use of the treatment energy but also undesirable heating of the copper stripes in proximity of the patient's skin. In addition, although not disclosed or suggested in Baranov, in order to generate an extended irradiation pattern at a depth below a patient's skin by utilizing the radiation mask in this embodiment of Baronov, the lens would have to be defocused to increase the treatment beam's cross-section at the selected depth. However, such an increase in the beam's cross section lowers the flux density at the treated portions thereby lowering treatment efficiency, and can also result in enhanced scattering in the regions above the treated portions. Compensating for the decrease in the flux density will require more powerful radiation sources, which can be expensive. Further, the increased scattering and/or flux density can exacerbate heating problems at the surface of the patient's skin.

Accordingly, claim 1, and claims 2-12, 14-16, 22, 23, and 25, which depend either directly or indirectly on claim 1, distinguish patentably over the combined teachings of Fuller and Baronov.

The arguments presented above apply with equal force to establish that independent claims 17, 45 and 46 are also patentable over Fuller in view of Baronov. In particular, as discussed above, neither Fuller nor Baronov teaches utilizing an optical system having a plurality of foci to concentrate radiation to a plurality of treated portions separated from one another by a plurality of untreated portions.

The Office Action rejects claims 13 and 26 as being unpatentable over Fuller in combination with Baronov and further in view of U.S. Patent No. 5,304,170 of Green.

Claim 13 depends on claim 1, via intervening claims 11, 10, and 9, and further recites that the duration of the step of applying radiation is greater than the thermal relaxation time of treatment portions. Claim 26 depends on claim 1, and further recites that the method can be utilized for treating acne, treating intradermal parasites, and treating various skin blemishes.

Claims 13 and 26 incorporate the features of claim 1 and hence distinguish over the combined teachings of Fuller and Baronov, which as discussed above do not teach these features. Further, Green does not bridge the gap in the teachings of Fuller and Baronov to render these claims obvious. In particular, Green, which generally relates to utilizing pulsed laser light to treat dermatological disorders, does not teach or suggest utilizing a multi-focal optical system to concentrate radiation onto a plurality of treatment portions that are separated by untreated portions. Hence, claims 13 and 26 are patentable.

The Office Action rejects claims 13, 24 and 26 as being unpatentable over Fuller in combination with Baronov and further in view of U.S. Patent No. 6,600,951 of Anderson. These claims depend on claim 1 and hence incorporate the features of claim 1 that are not taught or suggested by either Fuller or Baronov, as discussed above. Moreover, Anderson, which relates to laser treatments for sebaceous gland disorders, does not teach these features

either. For example, Anderson does not teach or suggest employing a multi-focal optical system to concentrate light onto a plurality of treatment portions separated from one another by untreated portions. Hence, these claims are patentable over the cited art.

The Office Action further rejects claims 27-43 as being obvious over Fuller in combination with Baronov.

Apparatus claim 27 recites, among other elements, an optical system *having a plurality of foci* for concentrating radiation applied thereto by a source to three-dimensional treatment portions within untreated portions of a selected volume. Neither Fuller nor Baronov teaches such a multi-focal optical system. In particular, both Fuller and Baronov utilize a single-focal element, a lens (e.g., a spherical lens in Fuller and a collimating lens in Baronov), for directing radiation to a selected region of the patient's tissue. Hence, the devices of Fuller and Baronov are structurally, and functionally, different than that recited in claim 27. Accordingly, claim 27, and claims 28-42 that depend either directly or indirectly on claim 27, distinguish patentably over the combined teachings of Fuller and Baronov.

The arguments presented above with respect to claim 27 apply with equal force to establish that claim 43 is also patentable over the combination of Fuller and Baronov. In particular, claim 43 recites, among other elements, an optical system exhibiting multiple foci for concentrating treatment radiation to treatment portions, each of which is surrounded by untreated and cooled skin. As discussed in detail above, neither Fuller nor Baronov teaches such a multi-focal optical system.

New Claims

New claims 47 depends on claim 1, and further recites that the optical system provides the multiple foci substantially simultaneously. New claim 48 depends on claim 1, and further recites that the optical system provides the multiple foci in a temporal sequence. Support for these claims can be found throughout the specification, for example, pages 21-26. The arguments presented above apply to establish that claims 47 and 48, similar to claim 1, distinguish over the cited art.

Independent claim 49 recites a method of treating a patient's skin that includes the steps of providing a radiation source, and directing radiation from the source to a plurality of spatially separated three-dimensional treatment portions disposed in a selected volume of the patient's tissue such that different treatment portions are irradiated sequentially over time. Support for this claim can be found throughout the specification, and more particularly, on pages 21-26.

Neither Fuller nor Baronov teaches irradiating a plurality of spatially separated treatment portions in a temporal sequencc. For example, in the embodiment of FIGURE 3A of Baronov, the irradiated spots are generated simultaneously, and not sequentially over time.

Hence, claim 49, and claim 50 that depends on claim 49, distinguish patentably over the cited art.

CONCLUSION

In view of the above amendments and remarks, Applicants respectfully request reconsideration and allowance of the application. Applicants invite the examiner to call the undersigned if there are any remaining issues.

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Respectfully submitted,

By _____
Reza Mollaaghababa
Registration No.: 43,810
NUTTER MCCLENNEN & FISH LLP
World Trade Center West
155 Seaport Boulevard
Boston, Massachusetts 02210-2604
(617) 439-2000
(617) 310-9000 (Fax)
Attorney for Applicant

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